

REMARKS

This Amendment is in response to the office action of November 20, 2002.
In the office action the Examiner rejected claims 1-24 all claims pending.

The Examiner first rejected claims 6 and 18 because of some informalities. Applicants have corrected claims 1 and 18 above which should overcome this objection.

The Examiner next rejected claims 1, 3, 8, 9, 11, 13, 14, 17, 18, and 20 under 35 USC 102 (b) has been anticipated by *Jenkins*.

The Examiner next rejected claims 1, 4, 5, 10-12, 15, 18, 21 and 22 under 35 USC 102 (b) as being anticipated by *Harada et al.*

The Examiner next rejected claims 1, 9, 17 and 18 under 35 USC 102 (b) as being anticipated by *Hein et al.*

The Examiner next rejected claims 1, 3, 4, 9-11, 14, 15, 18, 20, and 21 under 35 USC 102 (b) as being anticipated by *Balzer*.

The Examiner next rejected claims 10 and 19 under 35 USC 103 as being unpatentable over *Hein et al.* in view of *Balzer*.

The Examiner next rejected claims seven and 24 under 35 USC 103 is being a packable over *Hein et al.* in view of *Balzer* and further in view of *Jenkins*.

The Examiner next rejected claims 6 and 23 under 35 USC 103 as being unpatentable over *Harada et al.* in view of *Peterson*.

The Examiner next rejected claim 16 under 35 USC 103 as being unpatentable over *Jenkins* in view of *Harada et al.*

Applicants have cancelled claims 3, and 14 – 16 without prejudice.

Utility tractors equipped with front loader buckets and rear- or mid-mounted implements, such as hydraulically adjusted cultivators or rear blades, utilize a hydraulic selective control valve for controlling the movement of the front loader bucket, and a separate secondary hydraulic control valve for operating the rear-mounted implement. The selective control valve is operated by a primary control lever. The secondary hydraulic control valve is operated by a secondary control lever.

When an operator uses a vehicle having such a rear-mounted implement, the secondary lever and placement of the hand on the secondary lever are required to operate the rear-mounted implement. Moving the hand from one lever to another lever reduces productivity of the utility vehicle. Also, the primary lever and the secondary lever are typically placed on the vehicle fender and must have cables and/or linkages that connect the levers to the primary and secondary valves, which adds complication to the utility vehicle design.

The present invention provides a single control lever to operate multiple implements on a multi-functional vehicle, particularly a front-mounted implement and alternatively a rear-or mid-mounted implement. The present invention eliminates the secondary control valve from the open center hydraulic system which can reduce cost, power consumption, heat generation, and maintenance requirements. The present invention can conserve usable space in the vehicle operating area by eliminating the need for the secondary control lever.

The present invention provides a hydraulic system for a utility vehicle that comprises two operating implements or tools, one at each end of the utility

vehicle, or at a front end and a mid location of the vehicle. The hydraulic system includes a *front-mounted* first hydraulic operating implement and a *rear-or mid-mounted* second hydraulic implement, both hydraulically flow-connected to a diverter valve, the diverter valve connected to a control valve.

The diverter valve is selectively operated to hydraulically disconnect the control valve from the first hydraulic implement and connect the control valve to the second hydraulic implement. An implement-select operator control, such as a control switch, is signal-connected to the diverter valve and configured for alternately operating the first and second hydraulic implements using the control lever.

In contrast, *Jenkins* describes a utility vehicle having a selector control 26 on its dash board area but *separate* control levers for front and back implement operation. The loader boom and bucket controls 24 and 25 are mounted on the steering column (see column 2, lines 29 – 33, Figure 1) while the backhoe controls 30 to 33 are located behind the seat (see column 2, lines 37 – 41, Figure 1). *Harada et al.* describes a joystick operation that controls a diverter to differentiate between two cylinders, but both cylinders are at the front end of the loader.

Balzer and Peterson describe utility vehicles wherein hydraulic cylinders are only associated with one implement such as a scraper or ripper. *Hein et al.* describes a hydraulic circuit for operating two rear-mounted implements.

These references do not disclose or suggest the use of a diverter valve to utilize a single control lever to control alternately a front-mounted and a rear- or mid-mounted implement.

Applicants have added new claims 25 through 36, which, as set forth above, also describe patentable inventions.

In the Office Action, the Examiner crossed off a non-patent literature document on the Applicants' 1449 form of February 15, 2002 as being previously cited. This is in error as different pages of the same reference were cited on February 15, 2002. Applicants request the Examiner to initial Applicants 1449 form submitted February 15, 2002. A new copy is attached including the attached pages 13-115, 13-116 of the reference.

Applicants assert that all claims are now in condition for allowance.

Respectfully submitted

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VERSION SHOWING MARKED-UP CHANGES

IN THE CLAIMS

Please amend claim 1 as follows:

1. (Amended) A hydraulic system for a utility vehicle, comprising:
 - a first hydraulic implement;
 - a second hydraulic implement, wherein said first hydraulic implement is a front-mounted implement, and said second hydraulic implement is a rear-mounted implement;
 - a diverter valve, said first and second hydraulic implements selectively hydraulically flow-connected to said diverter valve;
 - a source of pressurized hydraulic fluid [connected] connectable to said diverter valve, said diverter valve selectively positioned to connect said source to either said first or to said second hydraulic implements to move a selected one of said first and second hydraulic implements; and
 - a control actuator signal-connected to said diverter valve for alternately operating said first and second hydraulic implements; and
wherein said control actuator comprises a control switch, actuation of said control switch changing position of said diverter valve to select one of said first and second hydraulic implements to be connected to said source of pressurized hydraulic fluid, and a lever positionable by an operator to control said source of pressurized hydraulic fluid to said diverter valve to selectively move said one of said first and second hydraulic implements.

Please amend claim 2 as follows:

2. (Amended) The system according to claim 1, wherein said diverter valve comprises a solenoid-operated pilot valve that is electrically signal-connected to said control switch [actuator], and a plurality of pilot operated hydraulic valves connected to said pilot valve, actuation of said pilot valve changing the position of said hydraulic valves.

Please cancel claim 3 without prejudice.

Please amend claim 4 as follows:

4. (Amended) The system according to claim 1, wherein said control switch is carried on said lever [control actuator comprises a lever positionable to control a selected one of said first and second hydraulic implements, and a control switch is connected to said lever, actuation of said control switch changing state of said diverter valve to select one of said first and second hydraulic implements].

Please amend claim 11 as follows:

11. (Amended) In a utility vehicle having a first hydraulic cylinder, a second hydraulic cylinder, and a hydraulic system for supplying pressurized hydraulic fluid to said first and second cylinders, said first and second cylinders each having a piston slidable therein, said piston having a piston head within said cylinder connected to a rod extendable into and out of said cylinder as said

piston head slides within said cylinder, said hydraulic system including a control valve supplied with a source of pressurized hydraulic fluid and operable to direct pressurized hydraulic fluid through tubing into said first hydraulic cylinder on one or both sides of said piston head to either extend or retract said rod with respect to said cylinder, and a control lever operating said control valve for selecting the respective side of the piston head within said cylinder to direct the pressurized hydraulic fluid, a control system comprising:

a diverter valve flow-connected to said control valve and operable to direct pressurized hydraulic fluid to one of said first cylinder or said second cylinder;
[and]

an operator control that is signal-connected to said diverter valve and actuatable by the operator to divert pressurized hydraulic fluid from the first cylinder to the second cylinder[.]; and

wherein said first cylinder and said second cylinder are located adjacent opposite ends of the vehicle.

Please cancel claim 14 without prejudice.

Please cancel claim 15 without prejudice.

Please cancel claim 16 without prejudice.

Please amend claim 18 as follows:

18. (Amended) A hydraulic system for a utility vehicle, comprising:

- a first pair of hydraulic couplings for a front-mounted first hydraulic implement;
- a second pair of hydraulic couplings for a rear-mounted second hydraulic implement;
- a diverter valve, said first and second pairs of hydraulic couplings selectively hydraulically flow-connected to said diverter valve;
- a source of pressurized hydraulic fluid [connected] connectable to said diverter valve, said diverter valve selectively positioned to connect said source to either said first or to said second hydraulic implements; and
- a control actuator signal-connected to said diverter valve for alternately operating said first and second pairs of hydraulic couplings; and

wherein said control actuator comprises a control switch, actuation of said control switch changing position of said diverter valve to select one of said first and second pairs of hydraulic couplings to have at least one coupling of the selected pair of couplings be connected to said source of pressurized hydraulic fluid, and a lever positionable by an operator to control said source of pressurized hydraulic fluid to said diverter valve to move said one of said first and second hydraulic implements.

Please amend claim 22 as follows:

22. (Amended) The system according to claim 21, wherein said control switch is located on said lever in a [positioned] position to be hand-activated.

Please add new claim 25:

25. (New) The system according to claim 1 wherein said utility vehicle comprises a tractor wherein said first hydraulic implement comprises a loader bucket, and said second hydraulic implement comprises one implement selected from the group consisting of a blade, a mower deck, a cultivator and a tiller.

Please add new claim 26:

26. (New) The system according to claim 4 wherein said utility vehicle comprises a tractor wherein said first hydraulic implement comprises a loader bucket, and said second hydraulic implement comprises one implement selected from the group consisting of a blade, a mower deck, a cultivator and a tiller.

Please add new claim 27:

27. (New) The system according to claim 1, wherein said control actuator comprises a control valve operatively controlled by said lever, said source of pressurized hydraulic fluid connected to said diverter valve via said control valve, said first implement comprising a first hydraulic cylinder having a piston therein and a pair of hydraulic ports into the first hydraulic cylinder on opposite sides of the piston therein;

said second implement comprising a second hydraulic cylinder having a piston therein and a pair of hydraulic ports into the second hydraulic cylinder on opposite sides of the piston therein;

said control valve having valve ports therein wherein for the hydraulic cylinder of said one of said first and second hydraulic implements selected at the diverter valve, a first position of said lever delivers pressurized hydraulic fluid to one port of said hydraulic ports and opens the respective other port of said hydraulic ports to a hydraulic discharge at a lower pressure than said pressurized hydraulic fluid, to move said piston in a first direction, and wherein a second, different position of said lever delivers pressurized hydraulic fluid to said respective other port of said hydraulic ports and opens said one port to a hydraulic discharge at a lower pressure than said pressurized hydraulic fluid to move said piston in an opposite direction.

Please add new claim 28:

28. (New) The system according to claim 11, wherein said utility vehicle comprises a tractor wherein said first hydraulic cylinder is configured to operate a loader bucket and said second cylinder is configured to orient an implement selected from the group consisting of: a blade, a mower deck, a cultivator and a tiller.

Please add new claim 29:

29. (New) A hydraulic system for a utility vehicle, comprising:

a first hydraulic implement;

a second hydraulic implement, wherein said first hydraulic implement is a front-mounted implement, and said second hydraulic implement is a mid-mounted implement;

a diverter valve, said first and second hydraulic implements hydraulically flow-connected to said diverter valve;

a source of pressurized hydraulic fluid connectable to said diverter valve, said diverter valve selectively positioned to connect said source to either said first or to said second hydraulic implements to move a selected one of said first and second hydraulic implements;

a control actuator signal-connected to said diverter valve for alternately operating said first and second hydraulic implements; and

wherein said control actuator comprises a control switch, actuation of said control switch changing position of said diverter valve to select one of said first and second hydraulic implements to be connected to said source of pressurized hydraulic fluid, and a control lever positionable to control said source of pressurized hydraulic fluid to said diverter valve to selectively move said one of said first and second hydraulic implements.

Please add new claim 30:

30. (New) The system according to claim 18, wherein said control actuator comprises a control valve operatively controlled by said lever, said source of pressurized hydraulic fluid connected to said diverter valve via said

control valve, said first implement comprising a first hydraulic cylinder having a piston therein and a pair of hydraulic ports into the first hydraulic cylinder on opposite sides of the piston therein;

said second implement comprising a second hydraulic cylinder having a piston therein and a pair of hydraulic ports into the second hydraulic cylinder on opposite sides of the piston therein;

said control valve having valve ports therein wherein for the hydraulic cylinder of said one of said first and second hydraulic implements selected at the diverter valve, a first position of said lever delivers pressurized hydraulic fluid to one port of said hydraulic ports and opens the respective other port of said hydraulic ports to a hydraulic discharge at a lower pressure than said pressurized hydraulic fluid, to move said piston in a first direction, and wherein a second, different position of said lever delivers pressurized hydraulic fluid to said respective other port of said hydraulic ports and opens said one port to a hydraulic discharge at a lower pressure than said pressurized hydraulic fluid to move said piston in an opposite direction.

Please add new claim 31:

31. (New) The system according to claim 30, wherein said control switch is located on said lever.

Please add new claim 32:

32. (New) A hydraulic system for a tractor, comprising:

a tractor chassis supported on four wheels;

a hydraulically operated loader bucket made operable by at least a first hydraulic cylinder, and mounted to said chassis adjacent a front end of said chassis;

a hydraulically operated implement, made operable by at least a second hydraulic cylinder, and carried by said chassis, selected from the group consisting of: a blade, a mower deck, a cultivator and a tiller;

a source of pressurized hydraulic fluid;

a control valve connected to said source of pressurized hydraulic fluid;

a diverter valve hydraulically flow-connected to said control valve, said first and second hydraulic cylinders being hydraulically flow-connectable to said diverter valve, said diverter valve selectively positioned to send pressurized hydraulic fluid from said control valve to a selected one of said first and second hydraulic cylinders;

a control switch, actuation of said control switch changing position of said diverter valve to allow pressurized hydraulic fluid to flow from said control valve to said selected one of said first and second hydraulic cylinders; and

a control lever operatively connected to said control valve and positionable to direct pressurized hydraulic fluid flow from said control valve to said selected one of said first and second hydraulic cylinders.

Please add new claim 33:

33. (New) The system according to claim 32, wherein said first hydraulic cylinder has a piston therein and a pair of hydraulic ports into the first hydraulic cylinder on opposite sides of the piston therein;

said second hydraulic cylinder has a piston therein and a pair of hydraulic ports into the second hydraulic cylinder on opposite sides of the piston therein;
and

said control valve has valve ports therein wherein for the hydraulic cylinder of said one of said first and second hydraulic implements selected at the diverter valve, a first position of said lever delivers pressurized hydraulic fluid to one port of said hydraulic ports and opens the respective other port of said hydraulic ports to a hydraulic discharge at a lower pressure than said pressurized hydraulic fluid, to move said piston in a first direction, and wherein a second, different position of said lever delivers pressurized hydraulic fluid to said respective other port of said hydraulic ports and opens said one port to a hydraulic discharge at a lower pressure than said pressurized hydraulic fluid to move said piston in an opposite direction.

Please add new claim 34:

34. (New) The system according to claim 32, wherein said second implement is mid-mounted on said tractor.

Please add new claim 35:

35. (New) The system according to claim 32, wherein said second implement is rear-mounted on said tractor.

Please add new claim 36:

36. (New) A hydraulic system for a tractor, comprising:

- a tractor chassis supported on four wheels;
- a hydraulically operated loader bucket made operable by at least a first hydraulic cylinder, and mounted to said chassis adjacent a front end of said chassis;
- a hydraulically operated implement, made operable by at least a second hydraulic cylinder, and carried by said chassis, selected from the group consisting of: a blade, a mower deck, a cultivator and a tiller;
- a source of pressurized hydraulic fluid;
- a control valve connected to said source of pressurized hydraulic fluid; and
- a control lever operatively connected to said control valve and positionable to direct pressurized hydraulic fluid flow from said control valve to a selected one of said first and second hydraulic cylinders.